



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Nondestructive Condition Monitoring for Tensioned Steel Members

Description

Many Corps of Engineers navigation structures contain embedded and external steel structural members which are under tension and subject to corrosion. Tainter gates and lock gate diagonal bracing are 2 examples. Tainter gates are restrained using trunnion bearings held in place by massive steel anchors embedded into the dam itself. Problems known to occur with anchors can lead to loss of anchor tension and consequent severe problems with gate operation. Repeated opening or closing of lock gates can cause excessive tension on diagonal bracing. All these problems are hidden and difficult to evaluate.



Issue

Current testing methods consist of visual inspection for corrosion, anchor length measurement or hammer testing to determine gross loss of tension, and jacking, which directly measures tension. Problems with current testing methods are accuracy, required time, and access. A non-destructive testing (NDT) method is needed to determine the tension and the degree of corrosion present. A method to continually monitor the tension while opening and closing the gates could prevent abrupt failures of the rods.



Users

District personnel who need information on anchor tension for economic planning purposes or for maintenance and/or operations.

Products

This technology can be used to conduct quantitative measurements of tension and corrosion in steel tainter gate anchor rods and lock gate diagonal bracing. The instrument will rapidly measure tension in the field and, with post-processing, will provide evaluation of fitness for service. It will be small, portable and will work in areas with limited access.

Benefits

This research will create a method that directly interrogates the mechanical and material properties of the steel structural members, addresses the corrosion problem, takes little time and human resources to perform, and requires minimal access.

Corps Program

Navigation Systems Research Program, Mr. James Clausner, Program Manager.

Point of Contact

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